

Asia. But in this connection it must also be remembered that Sven Hedin has seen large numbers of migrating ducks at great heights in Tibet, as for example at the source of the Indus, in autumn.

It is to be hoped that the zeal of the Russian ornithologists will soon bring to light further material in connection with the routes taken by Siberian ducks.'

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XX.—THE FLIGHT OF BIRDS AT HIGH ALTITUDES

It seems to me a remarkable fact that birds can fly with such apparent ease through very attenuated air. We are so accustomed to regard birds as highly modified for their particular medium. Their bones are hollow, and they are provided with air-sacs, it is said, in order to fit them for flight. Consequently we may feel a little surprise when we find how independent they are of the supporting power of the air.

When we ascend to 15,000 feet we find the pressure of the atmosphere almost halved: it possesses only half its supporting power. It might be anticipated that birds would suffer as a result of so great a change. But the facts are completely different. Birds at this height, and at much greater altitudes, fly with apparently the same facility as they do at sea level. To all appearances they are unaffected by the change.

Those of ordinary capacities of flight, such as mountain finches and Tibetan larks, fly about with their accustomed ease. Hill-pigeons fly as swiftly round the cliffs, choughs come as freely to the travellers' camps as do their representatives at the level of the sea. Even birds with highly specialized forms of flight seem equally unaffected by the lighter air. The snowcock is a bird that glides or parachutes, rarely if ever beating its wings. Yet it lives exclusively in this rarified atmosphere where it floats majestically across a gorge. The kestrel and some terns are poising birds, holding themselves stationary at one spot by forcibly beating their wings. Such poising is a highly specialized evolution. No form of aerial activity calls for so much exertion on the part of the bird. One might think that a mode of flight demanding so much effort would be impossible in rarified air. Yet in Tibet we see terns hovering over lakes, their bodies on a slant, their wings forcibly beating as they hold themselves stationary at fixed points. They poise as efficiently at 15,000 feet as they do along the sea shore. It is the same with the kestrel at high altitudes. I have seen it poised at 16,000 feet, and, when the wind was strong, it held itself stationary with scarcely a quiver of the wing. Indeed, so far from the thin air preventing its evolutions, the kestrel in Tibet has to hover perpetually. For on the plateau there are no trees or points of vantage from where it can keep a look-out for prey. Certain other birds surprise us by this remarkable independence. The ground-chough, for instance, has unusually weak flight, seldom going more

than a hundred yards at a time, and looking something like a fledgling that has just escaped from the nest. Yet it is a bird that lives exclusively at high altitudes. We meet with it in Tibet at 13,000 feet where it seems quite at home in the rarified air. The flight of the skylark is out of the ordinary. It towers up perpendicularly through the air while pouring forth its melodious notes. Yet its towerings seem in no way affected by altitude. In Tibet it towers and sings at 15,000 feet as delightfully as in an English field.

It is the same with soaring birds. Eagles and buzzards at 16,000 feet sail and circle with the same ease as do their representatives at moderate heights. The griffon loves to sail over Himalayan passes. I have often watched its effortless motion at a height of 20,000 feet. The lammergeyer used to visit our Mount Everest base camp and at that height of 17,000 feet used to float and circle and glide downward after food with all its accustomed facility and grace. Nor can it just sail in circles at this considerable height, but can carry itself up through the attenuated air without making the slightest movement of its wings. I do not know to what a height it can perform this feat. Certainly it can sail across the main Himalaya at the great height of 23,000 feet.

Birds which visited the Mount Everest base camps seemed in no way incommoded by the thin atmosphere. We had choughs and pigeons in Camp I at 18,000 feet, crows and mountain-finches in Camp III at 21,000 feet, choughs almost daily in Camp IV at 23,000 feet. Indeed choughs seemed completely independent of altitude for they followed the climbers to the immense height of 27,000 feet. Their capacities of flight appeared in no way diminished. There was nothing to show that they moved through an atmosphere reduced to one-third of its supporting power.

Thus we see how independent birds seem to be of the supporting influence of the air. Diminish the pressure of the atmosphere by half and ordinary flight seems in no way affected. And even those more elaborate aerial performances, such as parachuting, hovering, towering, soaring, are all performed with perfect ease.

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XXI.—THE OCCURRENCE OF THE GHARIAL (*GAVIALIS GANGETICUS*) IN BURMA

Mr. H. B. Prior has very kindly forwarded to me the skull of a crocodile recently shot in the Shweli River in Upper Burma.

We have sent you the skull because it is believed to be a gharial and the first record of its occurrence in Burma.

Moreover the fact of its being killed in the Shweli, well over a thousand miles by river from the delta of the Irrawaddi, is a point of great interest.